

### 1. Absolute Type Parallel Gray Code Output (Solid Shaft)

#### 1.1 Introduction:

SJ50 is a small economic universal design, compact, sturdy, high safety, and commonly used in industrial automations fields.

#### 1.2 Feature:

- Encoder external diameter  $\varnothing 51\text{mm}$ , thickness 29mm, diameter of shaft  $\varnothing 8\text{mm}$  (D type);
- Adopt non-contact photoelectric principle;
- Multiple electrical interfaces available;
- Resolution per turn up to 12Bits(4096)

#### 1.3 Application:

Textile, packaging, motor, CNC and other automation control fields.

#### 1.4 Connection:

- Radial cable (STD length 1M)
- Radial socket (M23\*1 16P male connector)
- Radial cable with plug (Cable length 1m, plug M16F-16K)

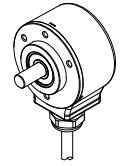
#### 1.5 Protection:

IP50 & IP65

#### 1.6 Weight:

About 300g

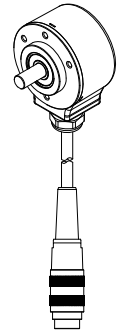
SJ50-T



SJ50-C

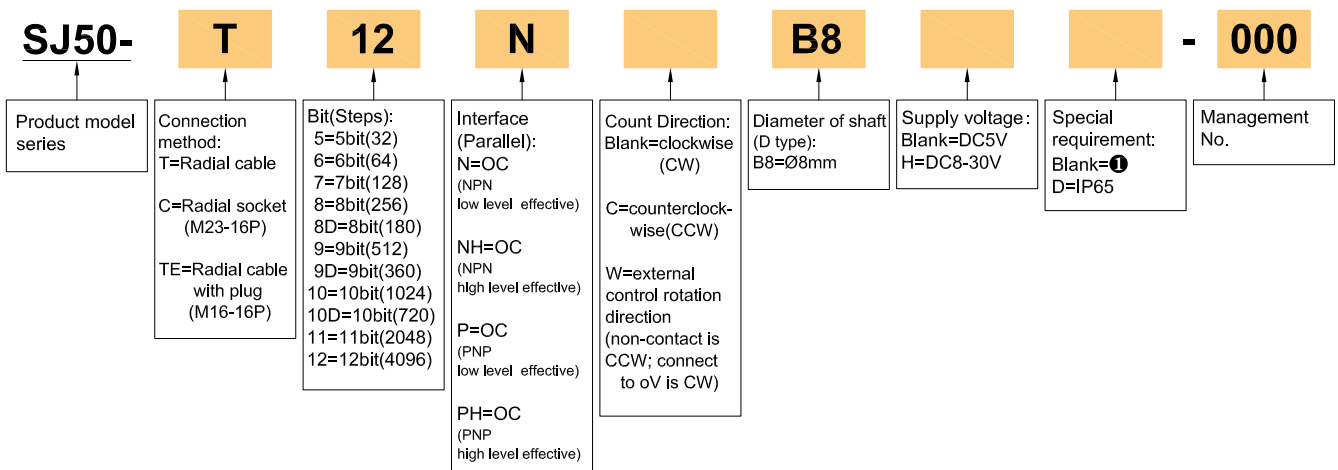


SJ50-TE



### 2. Model Selection Guide

#### 2.1 Model composition(select parameters)



#### 2.2 Note

- ①. None indicated for IP50 and cable length of 1M, if need to change the length C+number, the longest is 20M (expressed by C20).

3. Resolution Output Table

	bit											
	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...
31	0	0	0	0	0	0	0	1	0	0	0	0
32	0	0	0	0	0	0	1	1	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
37	0	0	0	0	0	0	1	1	0	1	1	1
38	0	0	0	0	0	0	1	1	0	1	0	1
...	...	...	...	...	...	...	...	...	...	...	...	...
63	0	0	0	0	0	0	1	0	0	0	0	0
64	0	0	0	0	0	1	1	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
75	0	0	0	0	0	1	1	0	1	1	1	0
76	0	0	0	0	0	1	1	0	1	0	1	0
...	...	...	...	...	...	...	...	...	...	...	...	...
127	0	0	0	0	0	1	0	0	0	0	0	0
128	0	0	0	0	1	1	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
151	0	0	0	0	1	1	0	1	1	1	0	0
152	0	0	0	0	1	1	0	1	0	1	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
217	0	0	0	0	1	0	1	1	0	1	0	1
218	0	0	0	0	1	0	1	1	0	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...
255	0	0	0	0	1	0	0	0	0	0	0	0
256	0	0	0	1	1	0	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
435	0	0	0	1	0	1	1	0	1	0	1	0
436	0	0	0	1	0	1	1	0	1	1	1	0
...	...	...	...	...	...	...	...	...	...	...	...	...
511	0	0	0	1	0	0	0	0	0	0	0	0
512	0	0	1	1	0	0	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
871	0	0	1	0	1	1	0	1	0	1	0	0
872	0	0	1	0	1	1	0	1	1	1	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
1023	0	0	1	0	0	0	0	0	0	0	0	0
1024	0	1	1	0	0	0	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
2046	0	1	0	0	0	0	0	0	0	0	0	1
2047	0	1	0	0	0	0	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
4094	1	0	0	0	0	0	0	0	0	0	0	1
4095	1	0	0	0	0	0	0	0	0	0	0	0

4. Output Mode

Interface(Parallel)	Output circuit	Output wave form
<p>OC (NPN)</p>		<p>Position: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21.....4095 View from shaft end, rotate direction is clockwise(CW)</p>
<p>OC (PNP)</p>		<p>Position: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21.....4095 View from shaft end, rotate direction is clockwise(CW)</p>

## 5. Electrical Parameters

Parameter Item	Interface (Parallel)		OC(NPN)	OC(PNP)
	Supply voltage	DC5V±5%; DC8V-30V±5%		
Allowable ripple	≤3%rms			
Consumption current	100mA Max			
Encoding type	Gray code			
Precision	[360/(resolutionx4)]°			
Top response frequency	100kHz Max			
Output capacity	Output current	Input	≤30mA	
		Output	—	
	Output voltage	"H"	—	
		"L"	≤0.4V	
Load voltage	≤DC30V			
Rise & Fall time	Less than 2us (Load resistance 1KΩ、cable length: 2m)			
Output level	Low level available		High level available	
Insulation strength	AC500V 60s			
Insulation resistance	10MΩ			
GND	Not connect to encoder			

## 6. Mechanical Specifications

Diameter of shaft	Ø8mm(stainless steel)
Starting torque	Less than $5 \times 10^{-3}$ N·m
Inertia moment	Less than $3 \times 10^{-6}$ kg·m <sup>2</sup>
Shaft load	Radial 50N; Axial 30N
Slew speed	≤4000 rpm; IP65≤3000 rpm
Bearing Life	$1.5 \times 10^9$ revs at rated load(10000hrs at 2500RPM)
Shell	Die cast aluminum
Weight	About 300g

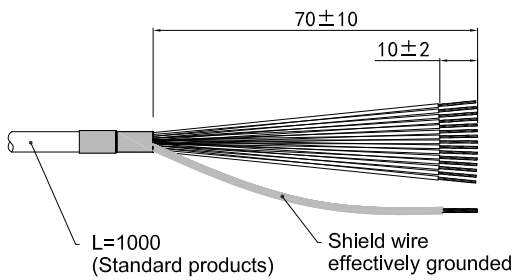
## 7. Environmental Parameters

Environmental temperature	Operating: -20~+85°C(repeatable winding cable: -10°C); storage: -25~+90°C
Environmental humidity	Operating and storage: 35~85%RH(noncondensing)
Vibration(Endurance)	Amplitude 0.75mm, 10~50Hz, 1h for X,Y,Z direction individually
Shock(Endurance)	49m/s <sup>2</sup> , three times for X,Y,Z direction individually
Protection	IP50; IP65

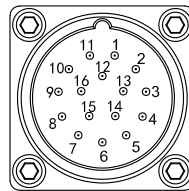
8. Wiring Table

Socket Pin No. & Color	Resolution4096	Resolution2048	Resolution1024 (720)	Resolution512 (360)	Resolution256 (180)	Resolution128	Resolution64	Resolution32
15=R=pink /black	bit1(2 <sup>0</sup> )	Not connect	←	←	←	←	←	←
14=P=gray /black	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )	Not connect	←	←	←	←	←
13=O=blue /black	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )	Not connect	←	←	←	←
12=N=yellow /black	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )	Not connect	←	←	←
11=M=green /black	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )	Not connect	←	←
10=L=white /black	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )	Not connect	←
9=K=pink	bit7(2 <sup>6</sup> )	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )	Not connect
8=I=gray	bit8(2 <sup>7</sup> )	bit7(2 <sup>6</sup> )	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )	bit1(2 <sup>0</sup> )
7=H=blue	bit9(2 <sup>8</sup> )	bit8(2 <sup>7</sup> )	bit7(2 <sup>6</sup> )	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )	bit2(2 <sup>1</sup> )
6=G=yellow	bit10(2 <sup>9</sup> )	bit9(2 <sup>8</sup> )	bit8(2 <sup>7</sup> )	bit7(2 <sup>6</sup> )	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )	bit3(2 <sup>2</sup> )
5=F=green	bit11(2 <sup>10</sup> )	bit10(2 <sup>9</sup> )	bit9(2 <sup>8</sup> )	bit8(2 <sup>7</sup> )	bit7(2 <sup>6</sup> )	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )	bit4(2 <sup>3</sup> )
4=E=white	bit12(2 <sup>11</sup> )	bit11(2 <sup>10</sup> )	bit10(2 <sup>9</sup> )	bit9(2 <sup>8</sup> )	bit8(2 <sup>7</sup> )	bit7(2 <sup>6</sup> )	bit6(2 <sup>5</sup> )	bit5(2 <sup>4</sup> )
3=D=brown	W (external control rotation direction: non-contact is CCW; connect to oV is CW)							
2=C=black	OV							
1=B=red	DC5V & DC8-30V							
0=A=shielding	GND							

Cable connection

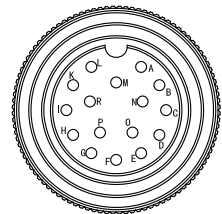


Radial socket connection



M23\*1 16P  
Male-connector pin Assignment

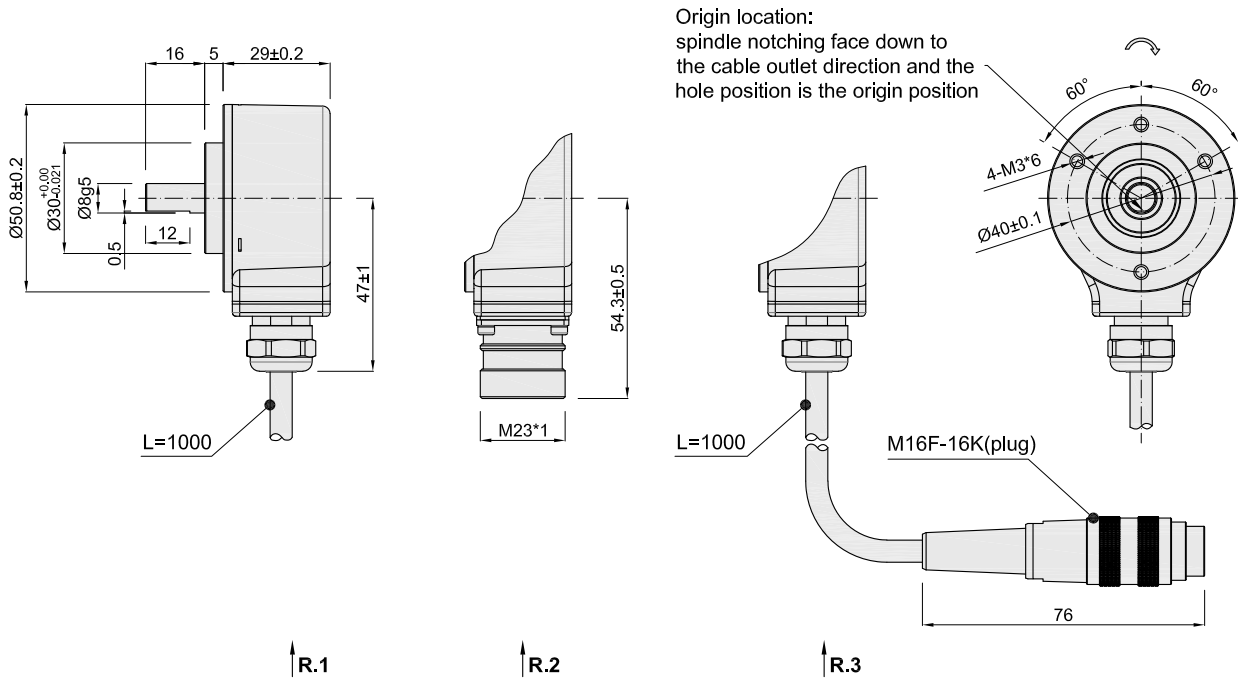
Radial cable with plug



M16F-16K  
Male-head pin Assignment

9. Basic Dimensions

9.1 Dimensions

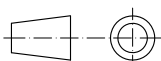


9.2 Assembling requirements



Notice : The radial runout of motor shaft should be less than 0.03, and the angle should be less than 1.0°.

Unit: mm



↻ = Shaft rotation direction of the signal output


R.1 = Radial cable (Standard length 1000mm)

R.2 = Radial socket (M23x1 16P Male-connector)

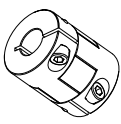
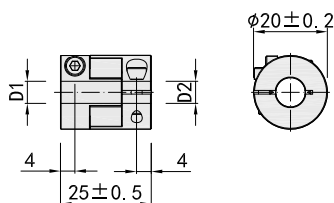
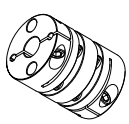
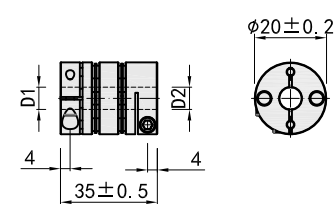
R.3 = Radial cable with plug (Standard length 1000mm, plug M16F-16K)

10. Accessories(Recommended purchase)

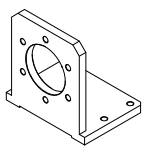
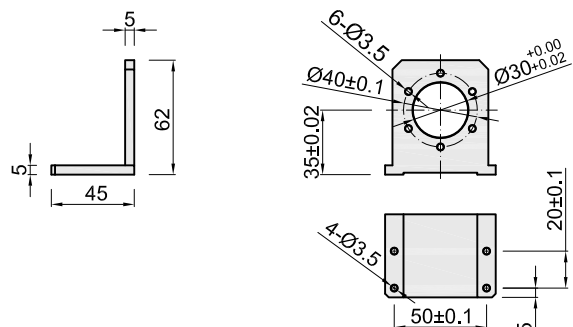
10.1 Plug connection

Plug and cable	Brief description	Model	Order No.
	C1=Connection type head A: M23, 16-pin female straight connector; Connection type head B: Bare wire end; Cable length: 1M 15-core with shield,halogen-free PUR	SJ50C1	44400027
	C2=Connection type head A: M23, 16-pin female straight connector; Connection type head B: Bare wire end; Cable length: 2M 15-core with shield,halogen-free PUR	SJ50C2	44400028
	C5=Connection type head A: M23, 16-pin female straight connector; Connection type head B: Bare wire end; Cable length: 5M 15-core with shield,halogen-free PUR	SJ50C5	44400029

10.2 Coupling

Coupling	Dimensions	D1	D2	Model	Order No.
Oldham coupling: M series 	 <p>material: aluminium alloy</p>	Ø6 <sup>G8</sup>	Ø8 <sup>G8</sup>	6M8	08700038
		Ø8 <sup>G8</sup>	Ø8 <sup>G8</sup>	8M8	08700039
		Ø8 <sup>G8</sup>	Ø10 <sup>G8</sup>	8M10	08700040
Plate flexible coupling: W series 	 <p>material: aluminium alloy</p>	Ø6 <sup>G8</sup>	Ø8 <sup>G8</sup>	6W8	08700042
		Ø8 <sup>G8</sup>	Ø8 <sup>G8</sup>	8W8	08700043
		Ø8 <sup>G8</sup>	Ø10 <sup>G8</sup>	8W10	08700044

10.3 Bracket

Bracket	Dimensions	Model	Order No.
 <p>material: aluminium alloy</p>		S50-50L30	03500165

## 11. Caution

### 11.1 About vibration

Vibration act on encoder always cause wrong pulse, so we should pay attention to working place. More pulse per revolution, narrower groovy spacing of grating, more effect to encoder by vibration, when rev is low or stop, vibration act on shaft or main body would cause grating vibrating, so encoder might make wrong pulse.

### 11.2 Caution for wiring

- Use the encoder under the specified supply voltage. Please note that the supply voltage range may drop due to the wiring length.
- Do not put the encoder wiring and other power lines through the same duct, and do not use them by bundling in parallel.
- Please use twisted pair wires for the signal and power wires of encoder.
- Please do not apply excessive force to the cable of encoder, or it will may be damaged.

